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Fire Size, 1961-1970; Preliminary Report
Subject To Revision. May 1974. 1
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FIRE SIZE 1961-1970

Research Note No. 15
May 1974

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RESEARCH NOTE NO. 15

May 1974

FIRE SIZE

1961 - 1970

PRELIMINARY REPORT

Subject to Revision

Alberta
LANDS AND FORESTS
Forest Service

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Alberta

LANDS AND FORESTS

Forest Service

FIRE INCIDENCE BY SIZE CLASS

ANNUAL

- Five year rolling averages were used to show the trend in fire incidence for the decade 1961-1970. This is shown in Figure 1. Figure 2 shows the trend of these same averages by size class. There appears to be a pronounced increase in the number of smaller size class fires with some decline in the larger class fires. This trend is probably due in part to the increase in the total number of fires during the past decade.

- In order to relate the relative occurrence of fires by size class the per cent of different size class fires were plotted using the five year rolling averages. Figure 3 shows the general trend.

- Table 1 shows the significance of this change. There appears to be an overall increase in the relative per cent of fires less than 10 acres (A and B size class) with an equivalent decline of the relative per cent of larger fires.

TABLE 1

COMPARISON OF PER CENT FIRE INCIDENCE BY SIZE CLASS
1957-1961 TO 1966-1970

Size Class	1957-1961 Average %	1966-1970 Average %	Change
A	41.8	52.0	+ 10.2
B	27.5	30.1	+ 2.6
C	17.4	9.8	- 7.6
D	8.4	4.4	- 4.0
E	4.9	3.7	- 1.2

- The Forest Service appears to have made commendable progress in firefighting. Even with a 35% increase in the total number of fires (using five year average) the number of large fires (100 acres +) decreased by 13% for the ten year period under consideration.

- Indications from these graphs however show that most of the change occurred in an earlier period with a general stabilization of the relative per cent in the latter part of the decade. Possibly the Forest Service had reached a peak where marginal gain in the ratio of small fires to large fires may be very costly in terms of future pre-suppression and suppression expenditures. Thus cost benefit studies would be vital for planning future expenditures.

MONTHLY AND WEEKLY

- Figures 4 to 8 show the monthly and weekly fire incidence by final size class.

FIGURE I

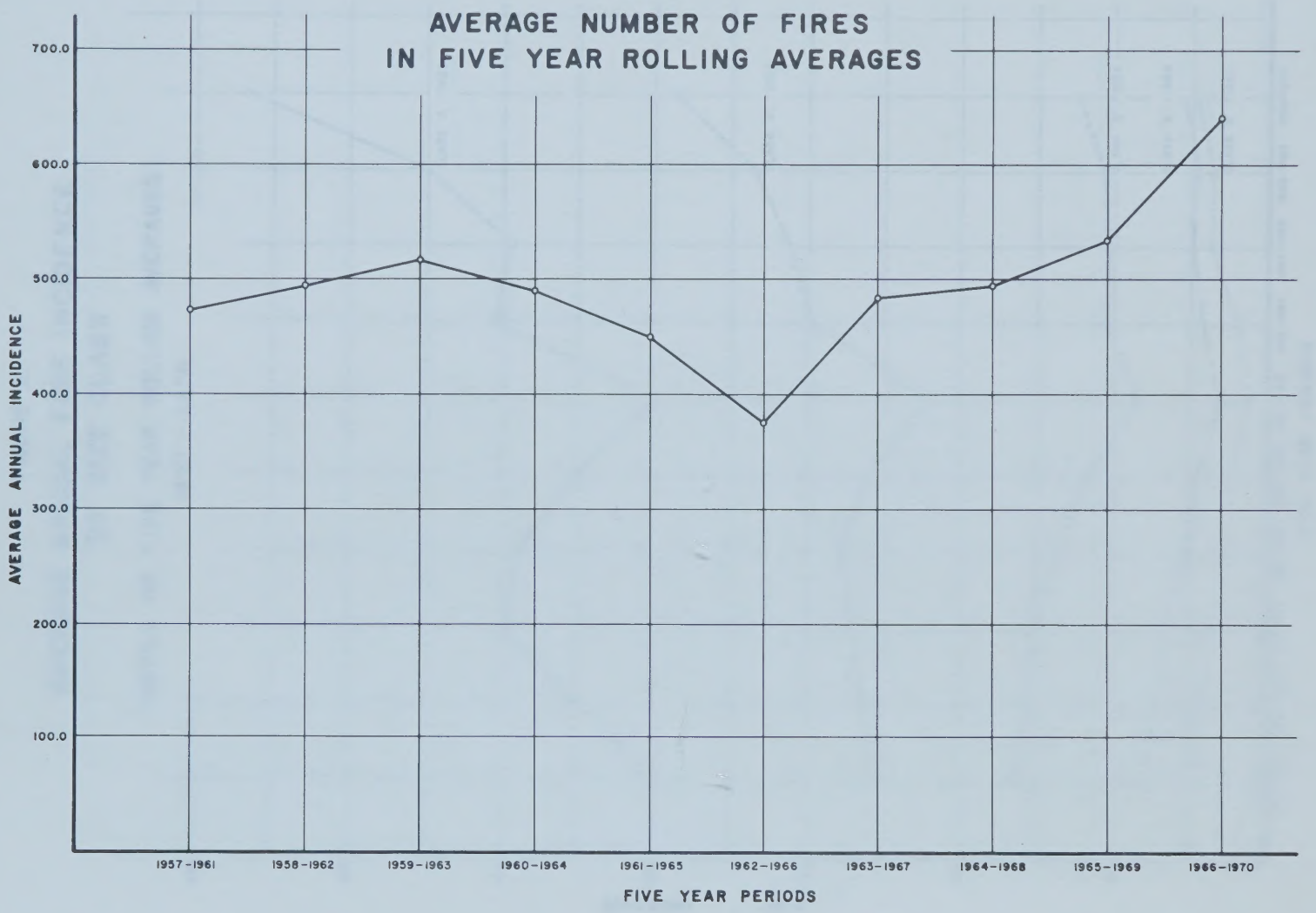
AVERAGE NUMBER OF FIRES
IN FIVE YEAR ROLLING AVERAGES
700.0
600.0
500.0
400.0
300.0
200.0
100.0
AVERAGE ANNUAL INCIDENCE
1957-1961
1958-1962
1959-1963
1960-1964
1961-1965
1962-1966
1963-1967
1964-1968
1965-1969
1966-1970
FIVE YEAR PERIODS

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FIGURE 2

AVERAGE ANNUAL FIRE INCIDENCE BY SIZE CLASS

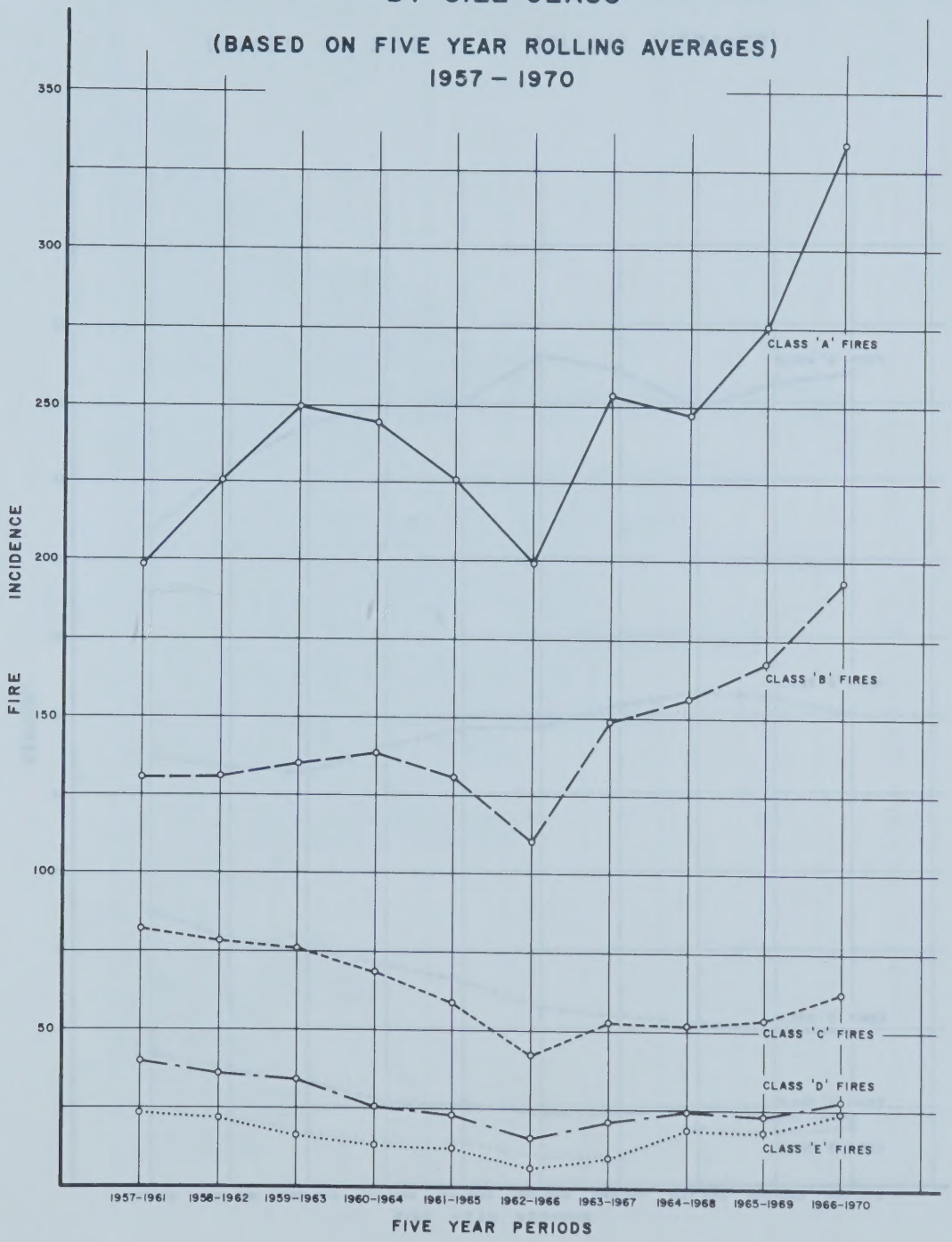


FIGURE 3

PERCENT OF FIRES BY SIZE CLASS

(BASED ON FIVE YEAR ROLLING AVERAGES)

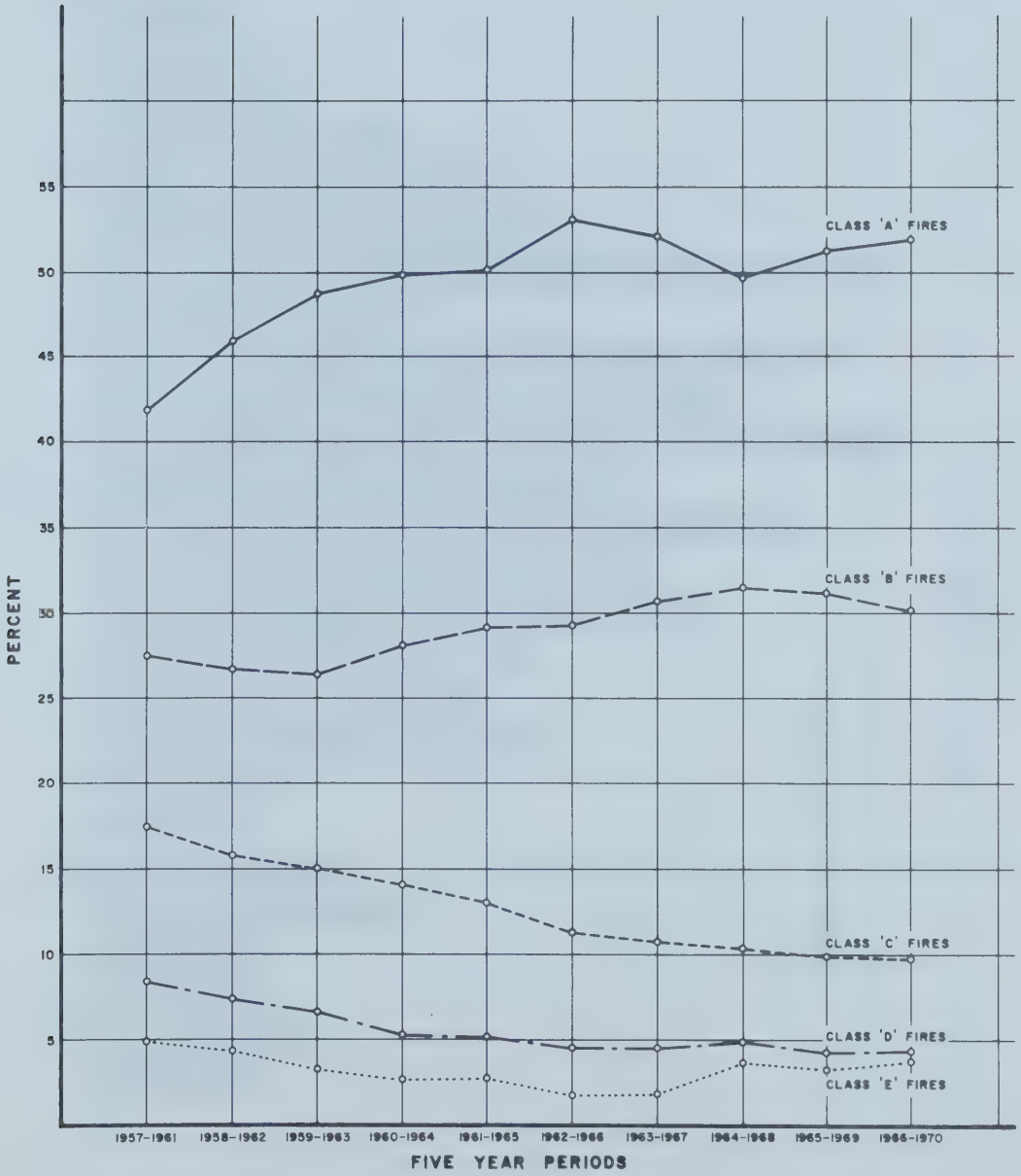


FIGURE 4

'A' CLASS FIRES

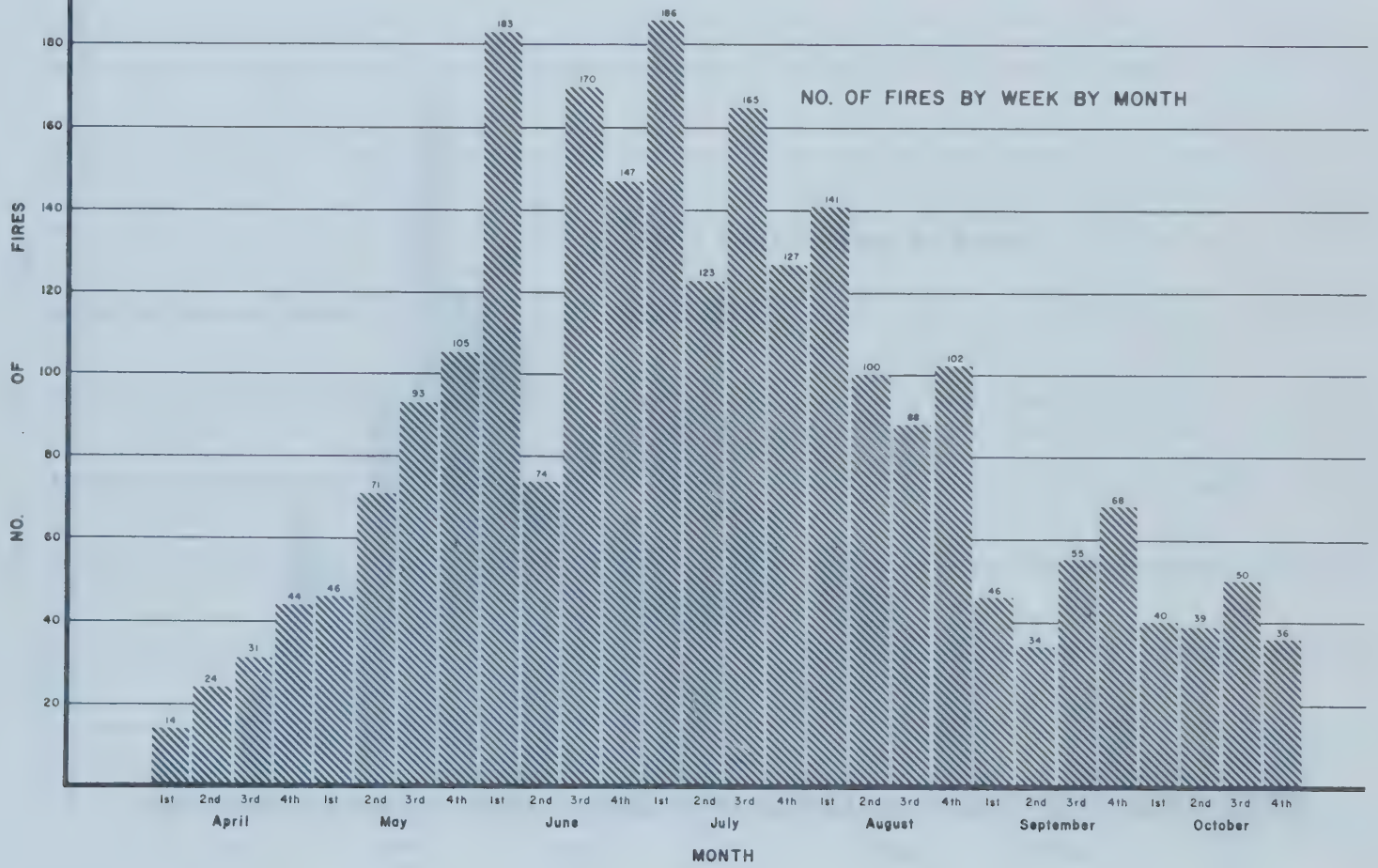


FIGURE 5

'B' CLASS FIRES

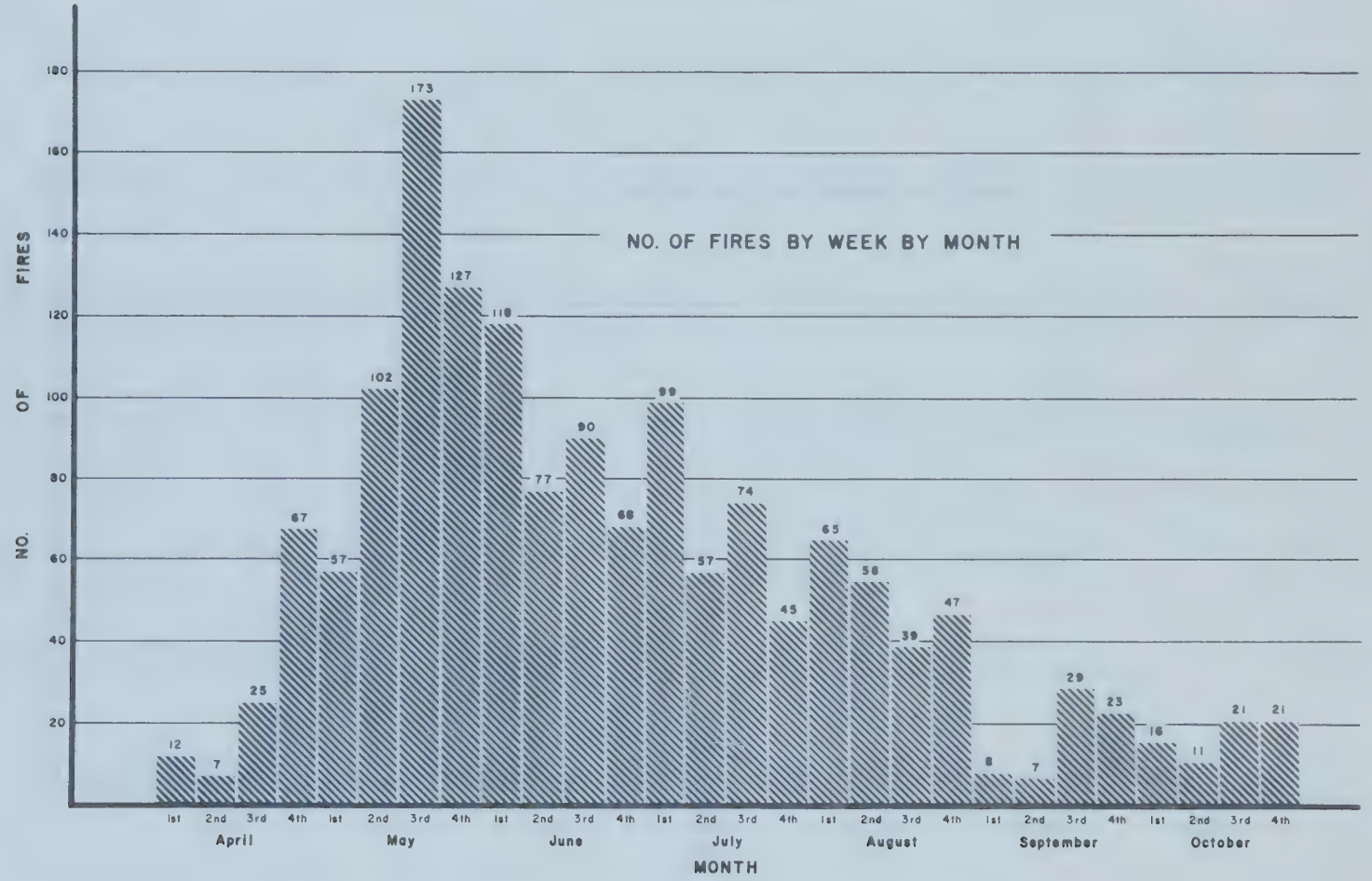


FIGURE 6

'C' CLASS FIRES

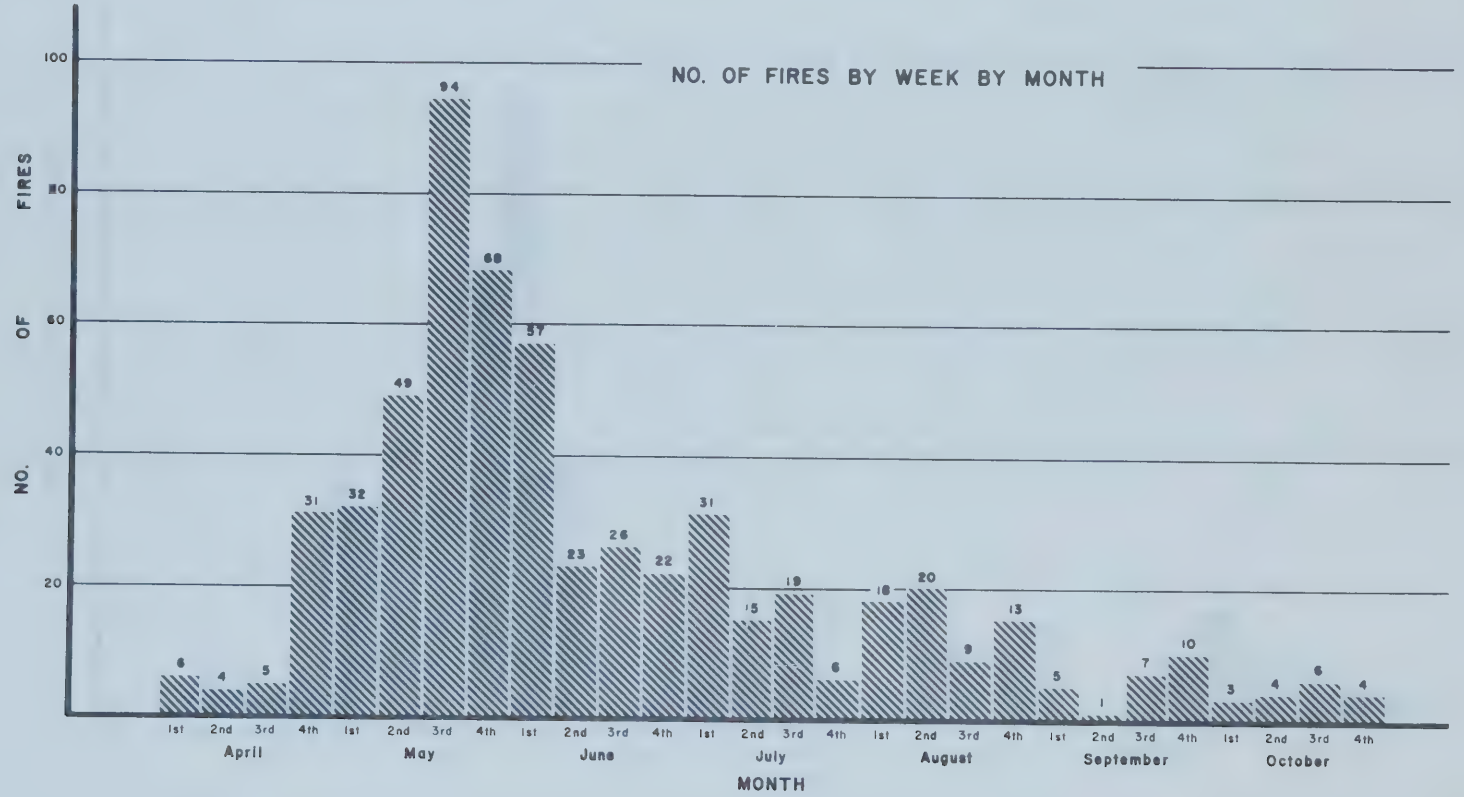


FIGURE 7

'D' CLASS FIRES

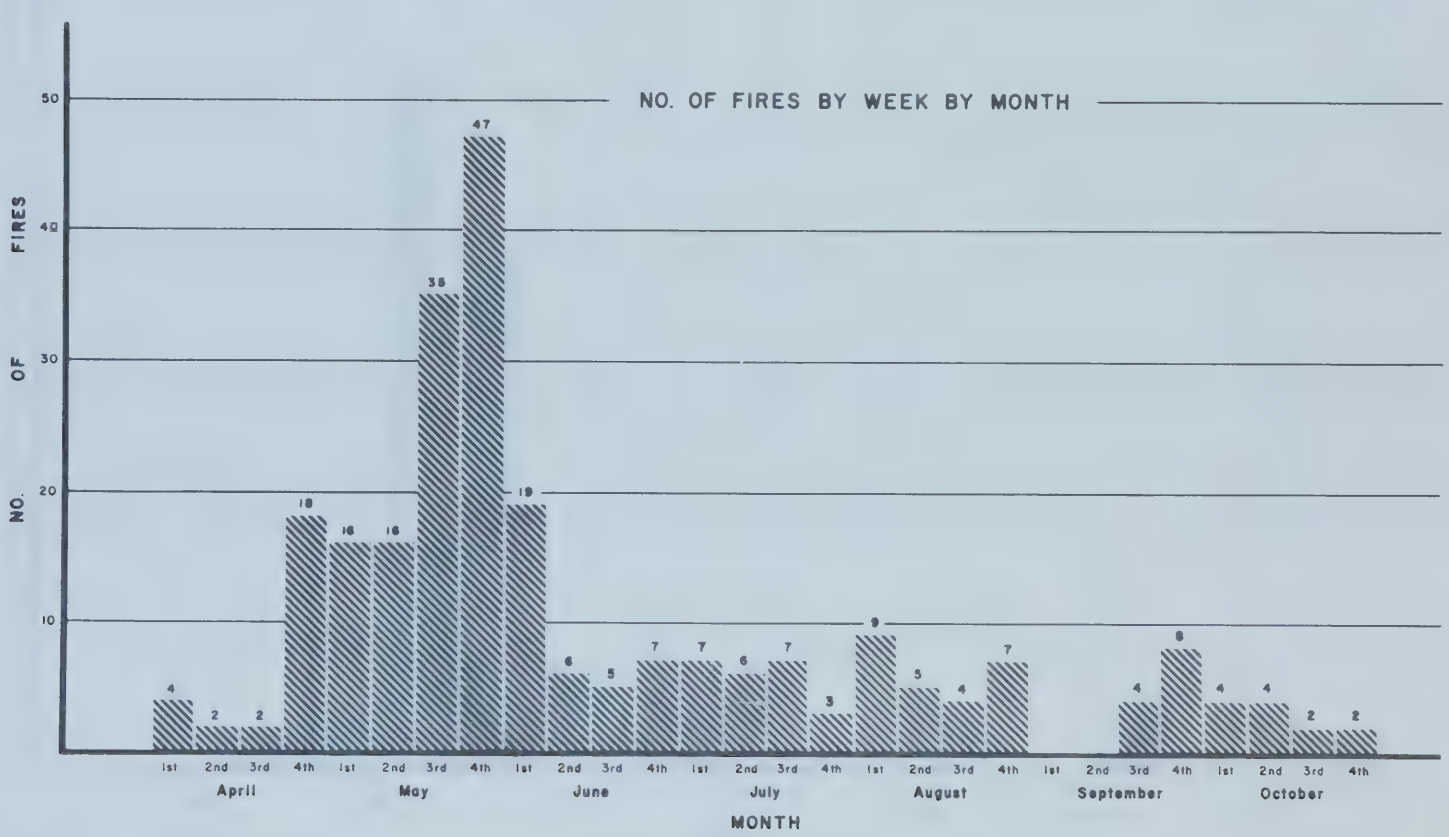
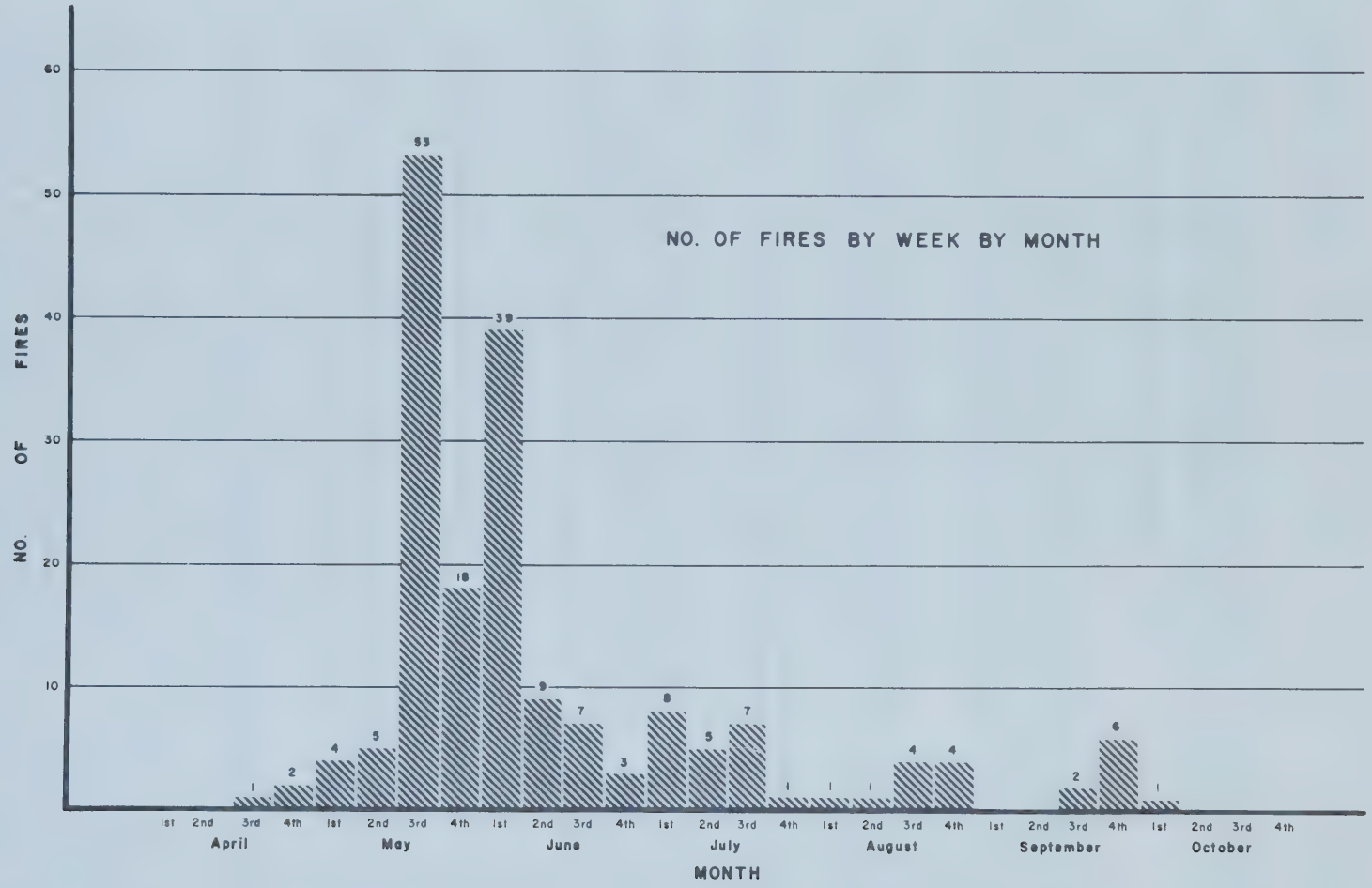


FIGURE 8

'E' CLASS FIRES



- The number of Class A size fires shows a progressive increase from the first week in April culminating in a major peak by the first week in June. The second week of June shows a drastic decline in the number of these fires. This is probably due to the decline of man-caused fires (especially settlement fires) without a comparable increase in lightning fires. Recovery to almost the original peak occurs in the third week of June. This peak is maintained until the third week of July then slowly tapers for the rest of the fire season.

- The number of Class B fires shows a rapid rise in the early part of the fire season peaking around the third week of May. The incidence then declines slowly for the remainder of the fire season.

- The incidence of Class C fires peaks similarly to the Class B fires with a peak occurring the third week of May. Decline in incidence is quite rapid after this period with the number stabilizing around the second week of June.

- Most of the Class D size fires occurred between the fourth week of April and the first week of May with a peak indicated in the latter part of May.

- The trend of "E" size class fires indicate a major peak of occurrence in the third week of May with a second peak occurring in the first week of June. The peak shown during the first week in May was primarily due to the 1968 fire season. Of the ten year total of 53 "E" size class fires, 44 fires occurred in the third week of May 1968.

- In summary the occurrence of small fires (A size class only) have shown an almost normal distribution throughout the fire season with the major peak occurring around the first week of July.

- The larger fires (B size class or larger) have shown a trend in incidence which is skewed towards the early part of the fire season with the peaks occurring around the third week in May till the first week in June.

- The spring fire season appears to be most susceptible to the large fire situation. Almost 50% of the fires that were extinguished with a total size greater than 10 acres were initiated during the four week period from the second week in May to the first week in June inclusive.

FIRE INCIDENCE AND AVERAGE FIRE SIZE

- Table 2 indicates the average acres burned per fire and the fire incidence by month for each year. Tables 3 and 4 show the fire incidence and size ranges by frequency of years.

MONTHLY SUMMARY

1. April

   - 10 year average fire incidence 33 fires
   - 10 year average fire size 80 acres

TABLE 2

FIRE INCIDENCE AND AVERAGE SIZE OF FIRE BY MONTH AND BY YEAR
1961 - 1970

FIRE SEASON ONLY

		1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
April	No. of Fires	72	24	11	69	13	15	11	51	38	28
	Ave. Acres/Fire	36	13	57	110	50	103	29	93	128	123
May	No. of Fires	203	49	77	86	46	126	127	308	90	126
	Ave. Acres/Fire	465	36	40	139	21	82	55	3,202	34	16
June	No. of Fires	248	85	98	91	50	104	116	67	126	177
	Ave. Acres/Fire	302	31	18	84	16	564	23	6	456	314
July	No. of Fires	58	37	197	43	88	41	193	81	126	137
	Ave. Acres/Fire	411	2	65	71	594	6	15	3	67	404
August	No. of Fires	97	27	66	21	36	26	185	11	124	152
	Ave. Acres/Fire	49	2	4	9	1	1	53	1	17	44
September	No. of Fires	16	13	31	5	2	35	100	26	10	85
	Ave. Acres/Fire	1	7	3	Spot	Spot	24	46	Spot	3	202
October	No. of Fires	23	19	35	17	27	50	41	8	6	5
	Ave. Acres/Fire	158	Spot	5	3	20	19	7	Spot	71	1

TABLE 3

FIRE INCIDENCE FREQUENCY BY YEARS

No. of Fires/Year	April	May	June	July	August	September	October
	No. of Years						
1 - 50	7	2		3	5	8	10
51 - 100	3	3	5	3	2	2	
101 - 200		3	4	4	3		
201+		2	1				
	10	10	10	10	10	10	10

TABLE 4

AVERAGE FIRE SIZE FREQUENCY BY YEARS

Average Acres/Year	April	May	June	July	August	September	October
	No. of Years						
1 - 50	4	5	5	4	9	9	8
51 - 100	2	2	1	3	1		1
101 - 500	4	2	3	2		1	1
501 - 1000			1	1			
1001+		1					
	10	10	10	10	10	10	10

- Seventy per cent of the years indicated less than 50 fires during the month with the remaining 30% showing greater than 50 but less than 100 fires for the month.

- Four years of the decade had an average fire size of greater than 100 acres but less than 500 acres.

- The other six years average fire size was less than 100 acres.

2. May

- 10 year average fire incidence 123 fires

- 10 year average fire size 905 acres

- Five years of the decade averaged more than 100 fires for this month. In 1968 the total number of fires reached the highest point in the decade for any single month.

- Although the ten year average fire size for May is the highest of any fire season month, only three years of the decade had an average May fire size of greater than 100 acres. The high average fire size could be attributed to the extensive acreages burned in May of 1968 when the average fire size exceeded 3,000 acres per fire.

3. June

- 10 year average fire incidence 116 fires

- 10 year average fire size 226 acres

- All years in the decade averaged more than 50 fires in the month of June. Five of the ten years averaged greater than 100 fires for this month.

- Four years of the decade had an average fire size greater than 100 acres.

4. July

- 10 year average fire incidence 100 fires

- 10 year average fire size 159 acres

- Although seven years of the decade had a fire incidence greater than 50 fires, only four of these years indicated an incidence of greater than 100 fires.

- Only three years in the decade had an average fire size greater than 100 acres per fire. These years indicated an average acreage in excess of 400 acres per fire for July.

5. August

   - 10 year average fire incidence 75 fires
   - 10 year average fire size 32 acres
   - Seven of the ten years averaged 100 fires or less with five of these years averaging less than fifty fires.
   - The maximum acreage per fire occurred in August 1967 when the average per fire was 53 acres.

6. September

   - 10 year average fire incidence 32 fires
   - 10 year average fire size 70 acres
   - All years indicated a fire incidence of less than 100 fires for this month. Eight of the 10 years had less than 50 fires for September.

7. October

   - 10 year average fire incidence 27 fires
   - 10 year average fire size 23 acres
   - All 10 years had a fire incidence less than 50 fires for the month.
   - Only in two years did the average fire size exceed 50 acres during the month.
   - The maximum average fire size for this month occurred in 1961 when the average was 158 acres.

FOREST SUMMARY

- Table 5 is a summary of fire incidence and average fire size for each month by Forest.

1. Athabasca

   - June was the worst fire month considering both incidence and fire size.
   - Fire season appeared to end by September during this decade.

2. Bow River

   - August was the worst month for this Forest. However the average number of fires for this month only just exceeded 5 with an average acreage of less than 100 acres thus it appeared that Bow River Forest fire season was reasonably quiet for this decade.

TABLE 5

FIRE INCIDENCE AND AVERAGE FIRE SIZE BY MONTH BY FOREST

Forest		April	May	June	July	August	September	October	Annual Average
Athabasca	No. of Fires	0.4	2.3	10.4	10.4	.73	.01	.01	31.4
	Ave. Size/Fire	7	7.4	440	178	75	Spot	Spot	273
Bow River	No. of Fires	13	4.4	3.1	5.8	5.1	2.1	1.4	25.6
	Ave. Size/Fire	18	16	7	10	93	Spot	10	26
Crowsnest	No. of Fires	.02	1.2	1.0	4.0	5.7	1.7	.09	16
	Ave. Size/Fire	Spot	1	Spot	1	1	2	1	5
Edson	No. of Fires	3.1	9.2	11.5	8.8	6.3	2.4	2.7	48.5
	Ave. Size/Fire	3	307	33	16	57	28	1	78
Footner Lake	No. of Fires	2.0	9.7	19.4	17.2	12.0	1.4	.04	64.8
	Ave. Size/Fire	68	59	561	768	10	37	112	386
Grande Prairie	No. of Fires	1.5	8.2	6.6	6.8	2.3	3.0	1.5	33.4
	Ave. Size/Fire	51	446	24	29	16	477	27	168
Lac La Biche	No. of Fires	1.8	13.1	10.4	4.8	3.2	1.2	2.0	38.2
	Ave. Size/Fire	65	1915	455	7.7	9	1	1	786
Peace River	No. of Fires	23	8.7	6.9	7.0	8.5	2.4	2.2	40.8
	Ave. Size/Fire	37	232	444	43	33	72	129	152
Rocky-Clearwater	No. of Fires	41	11.9	11.6	4.8	4.8	4.5	3.6	51.8
	Ave. Size/Fire	1	171	51	3	1	1	6	52
Slave Lake	No. of Fires	8.3	31.5	20.5	14.5	11.9	7.2	7.9	108.6
	Ave. Size/Fire	16	1373	54	3	18	6	17	414
Whitecourt	No. of Fires	7.9	23.2	14.8	16.0	7.4	6.3	4.4	87.1
	Ave. Size/Fire	39	731	53	4	45	79	15	250

3. Crowsnest

   - With an average fire size equalling one acre or less the Crowsnest Forest had very little problems with fires.

   - Fire incidence was also very low with the maximum number of fires occurring in August (10 year average - 6 fires).

4. Edson

   - Although not the highest incidence month, May fires exceeded an average of 300 acres per fire in size.

   - The highest incidence month for this Forest was June with an average of 12 fires.

5. Footner Lake

   - Both June and July are definitely bad fire months for this Forest. In these months the fires averaged 561 acres and 768 acres respectively.

6. Grande Prairie

   - Grande Prairie appears to have major problems with fire in both spring and fall season. In both May and September the average acreage exceeded 400 acres.

   - Although some of the summer months have a higher incidence than the fall months the average acreage per fire did not exceed 30 acres.

7. Lac La Biche

   - Although the month of May is indicated as the worst month in this Forest, the average fire size shown is very prejudiced by the large fires which occurred in May 1968. During that month 11 fires averaged over 20,000 acres each.

   - The fall hazard does not appear to exist in Lac La Biche.

8. Peace River

   - May has the highest fire incidence but June has the largest average acreage per fire (almost twice as much as May) for this Forest.

   - Peace River had a higher consistent average acreage burned per fire per month than any other Forest.

9. Rocky-Clearwater

   - The spring fire month appears to be the worst part of the season for this Forest.

   - May is the worst month followed by June. Fire season appeared to be slack for the rest of the month with the average fire size not exceeding 6 acres.

10. Slave Lake

   - The month of May is indicated to be the worst month for Slave Lake with an average incidence for this month equal to 32 and an average fire size of 1,373 acres. Here again the May 1968 fires influenced the average with 14 fires averaging almost 35,000 acres each during this month.

   - Other than the month of May, Slave Lake had a relatively better fire season during the decade in comparison to the other northern and central Forests. The maximum average fire size for all months other than May was 54 acres.

11. Whitecourt

   - The month of May was the worst month for Whitecourt also. Indications were again that the May 1968 fires had influenced the average fire size and incidence.

   - The average fire size for all other months did not exceed 100 acres per fire.

- Graphical representation of the monthly average fire size for each Forest is shown in Figures 9 to 18.

AVERAGE ACRES PER FIRE PER MONTH

FIGURE 9

ATHABASCA FOREST

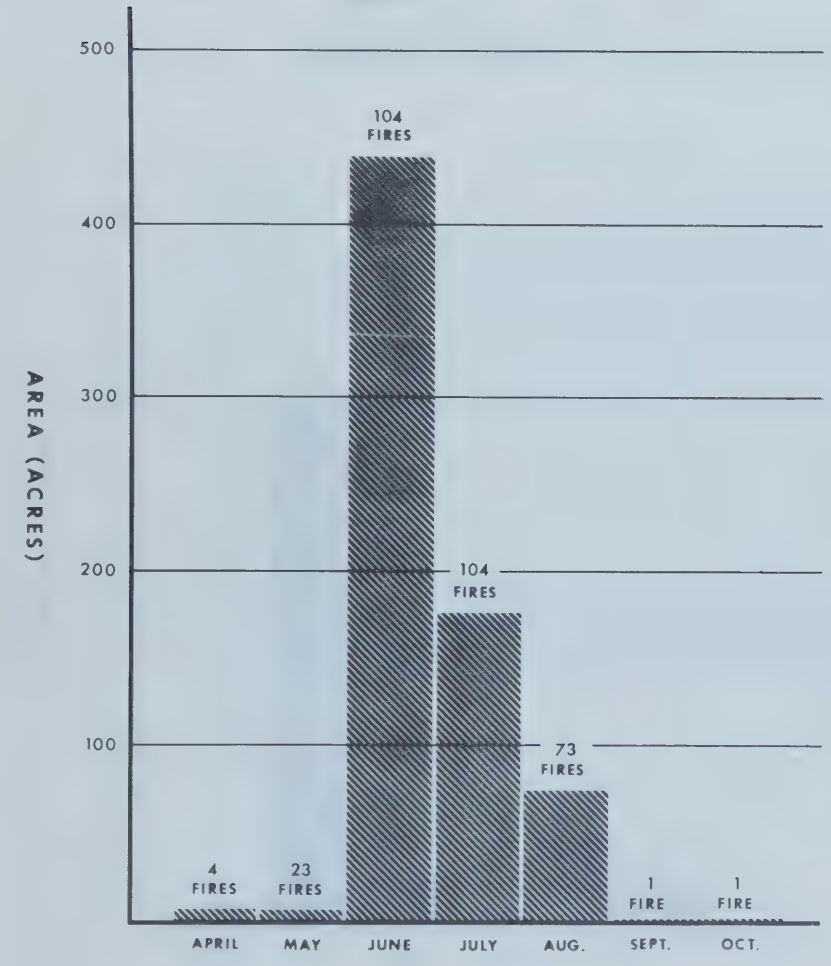
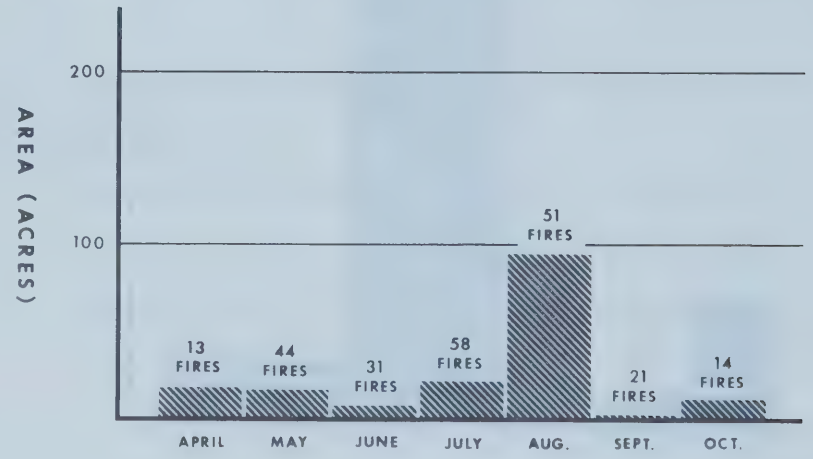


FIGURE 10

BOW RIVER FOREST



AVERAGE ACRES PER FIRE PER MONTH

FIGURE 11

EDSON FOREST

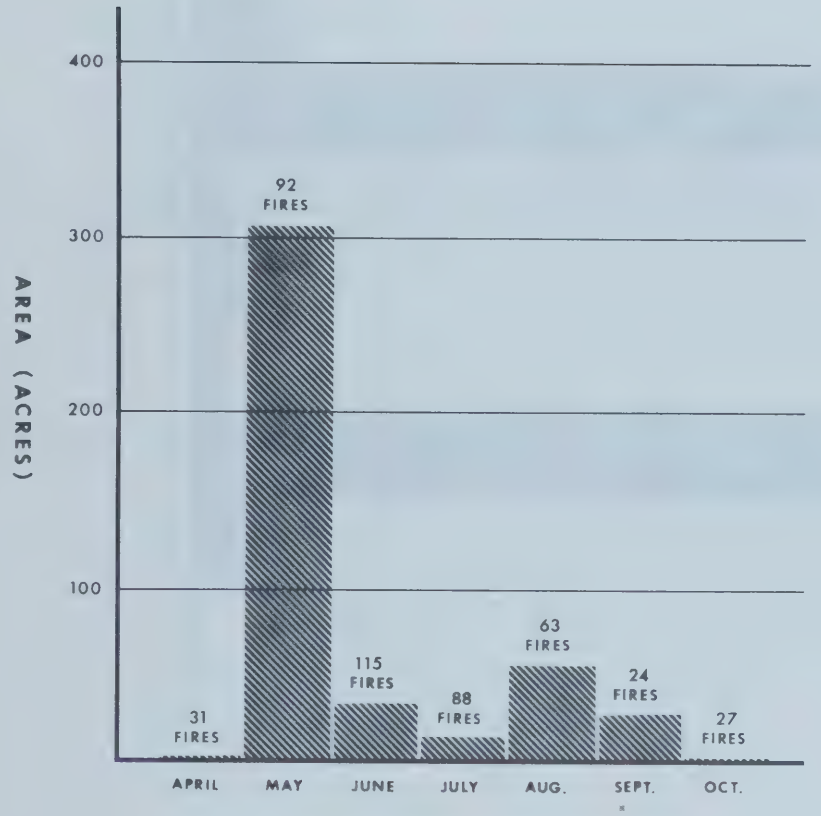


FIGURE 12

FOOTNER LAKE FOREST

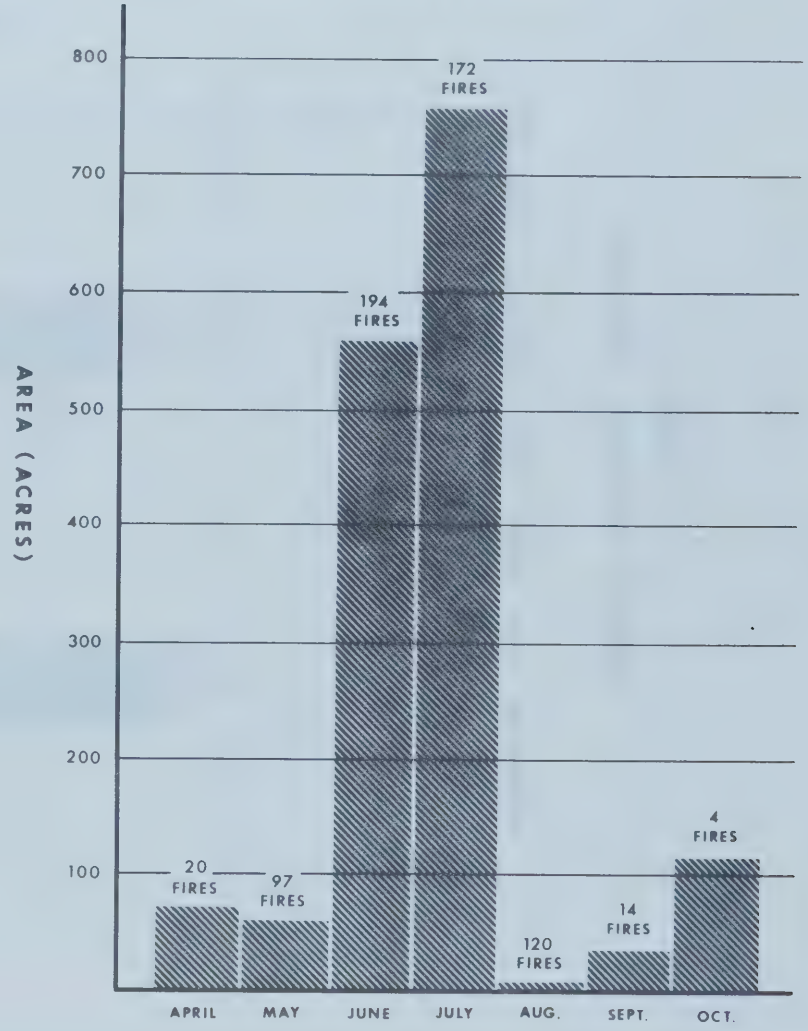


FIGURE 13

GRANDE PRAIRIE FOREST

AVERAGE ACRES PER FIRE PER MONTH

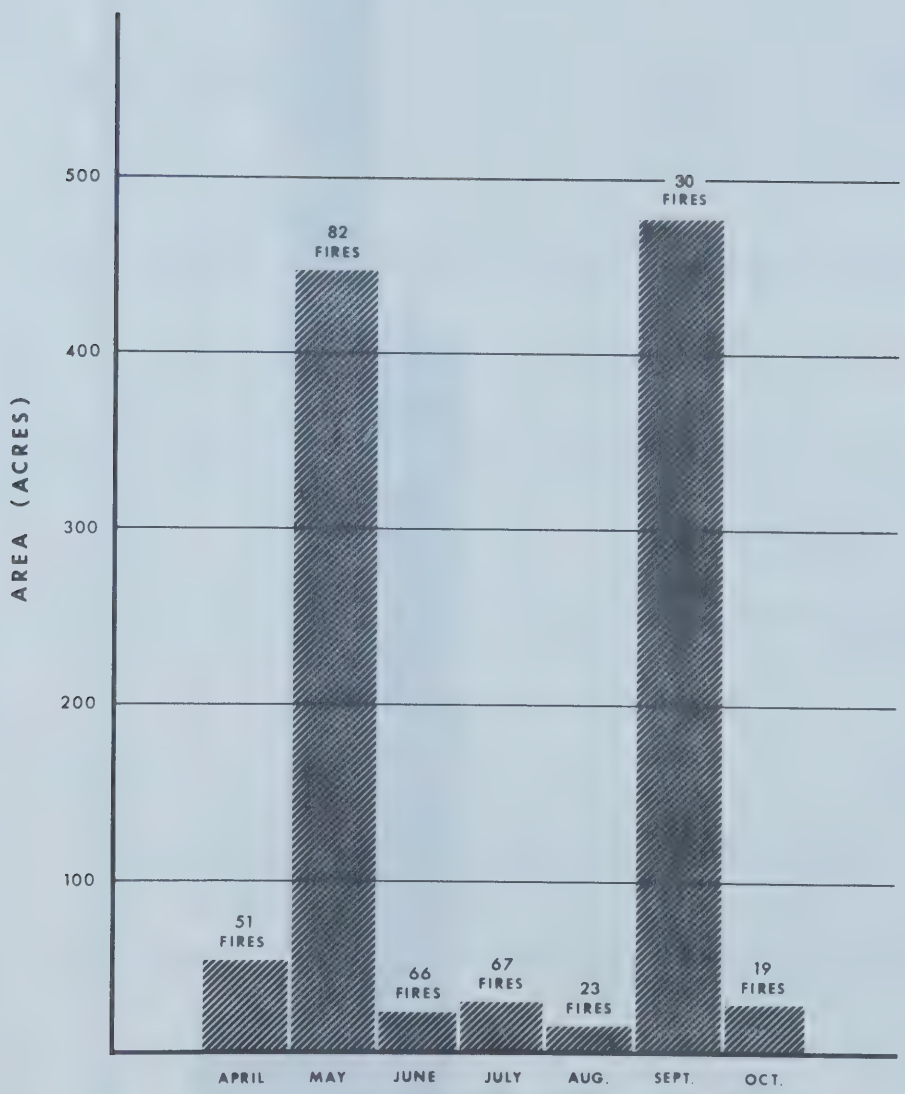
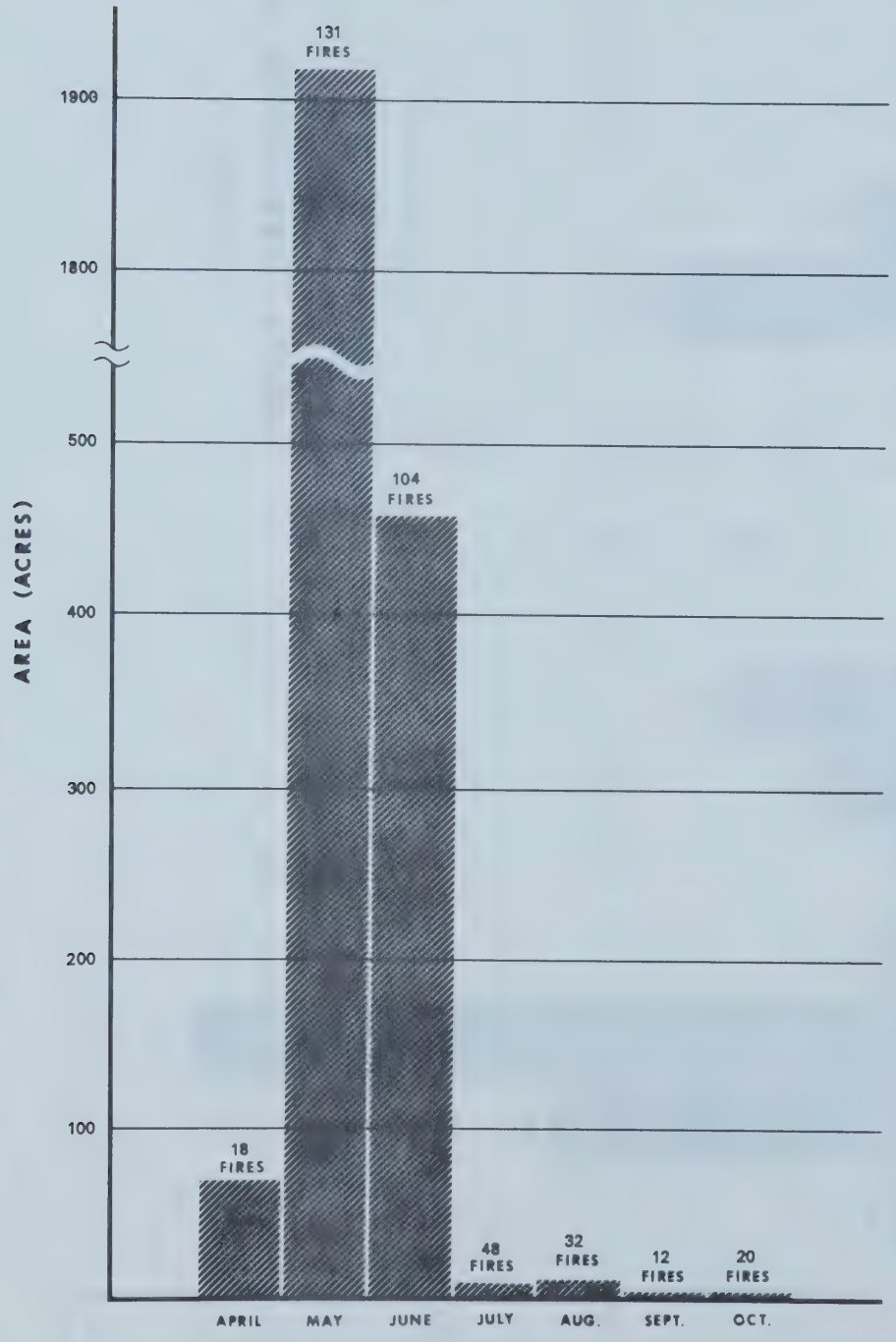


FIGURE 14

LAC LA BICHE FOREST

AVERAGE ACRES PER FIRE PER MONTH



AVERAGE ACRES PER FIRE PER MONTH

FIGURE 15

PEACE RIVER FOREST

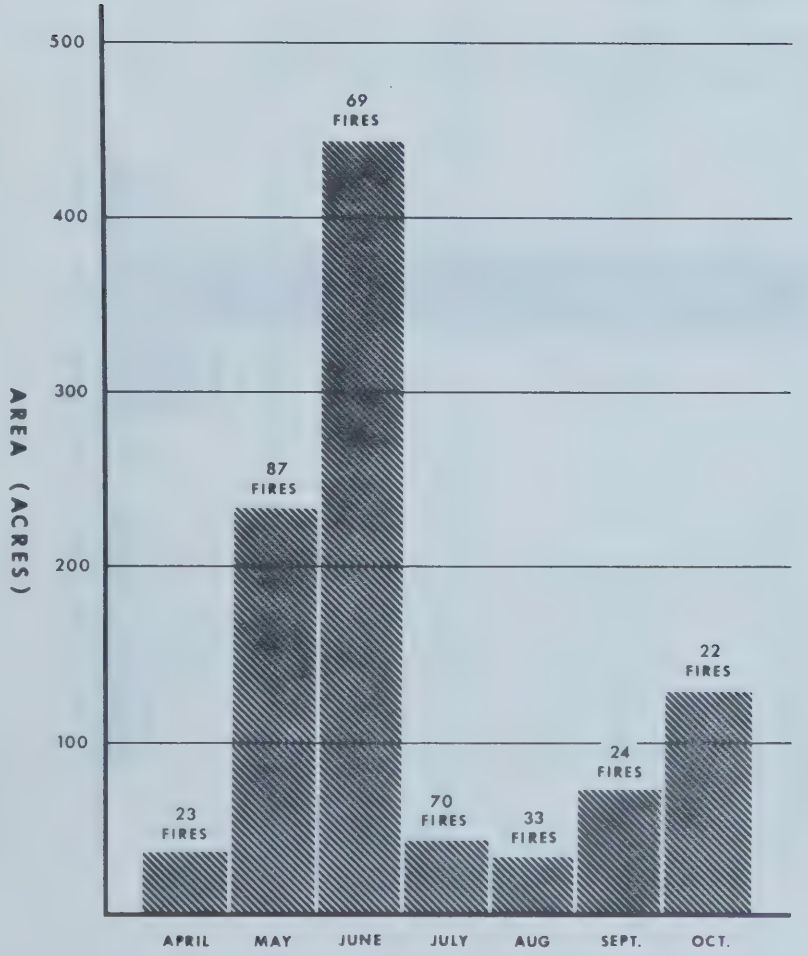


FIGURE 16

ROCKY – CLEARWATER FOREST

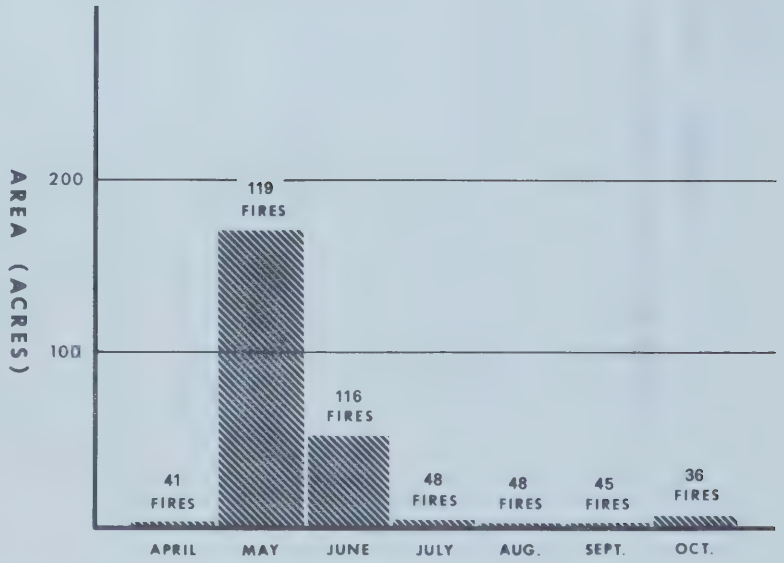


FIGURE 17

SLAVE LAKE FOREST

AVERAGE ACRES PER FIRE PER MONTH

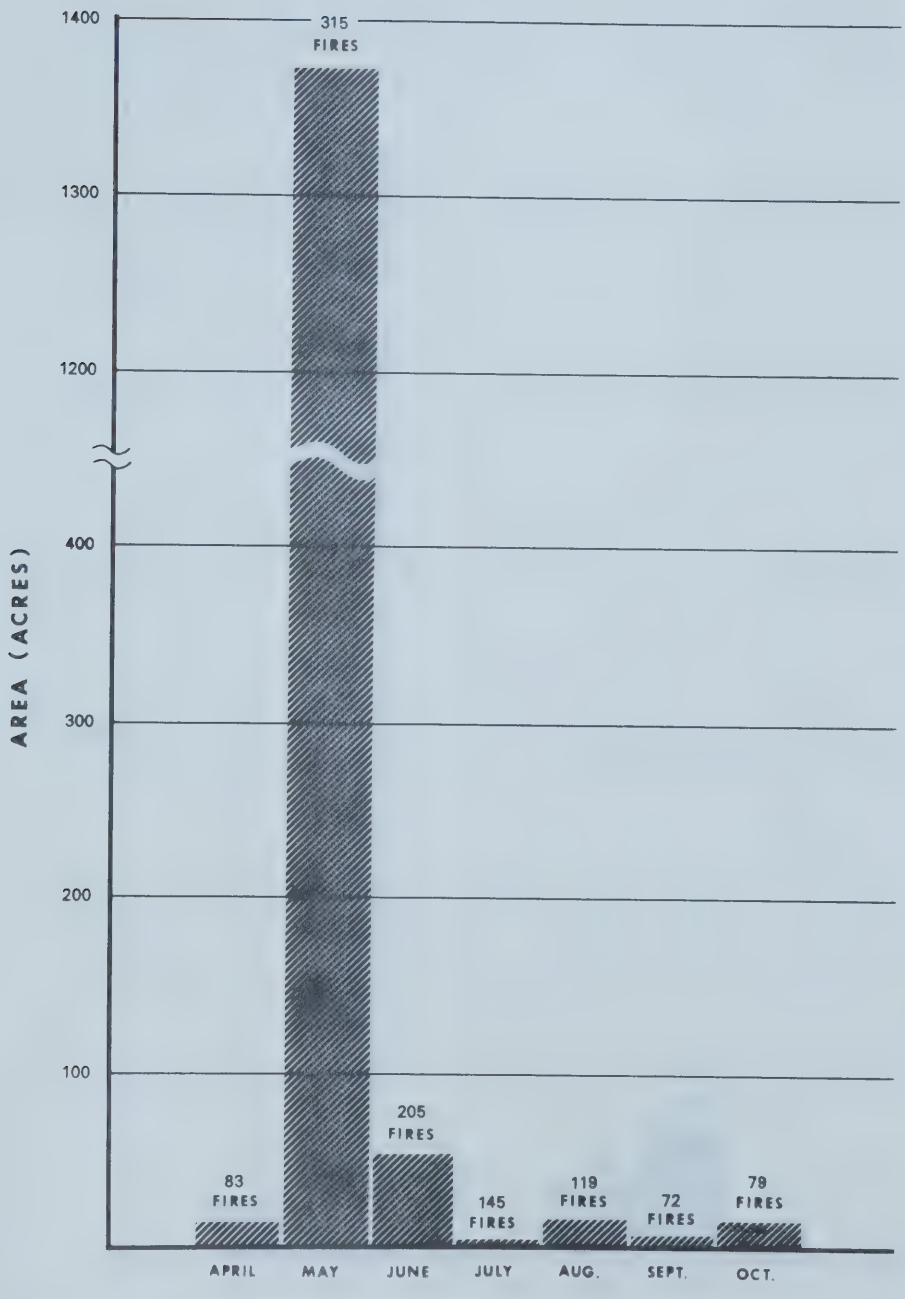
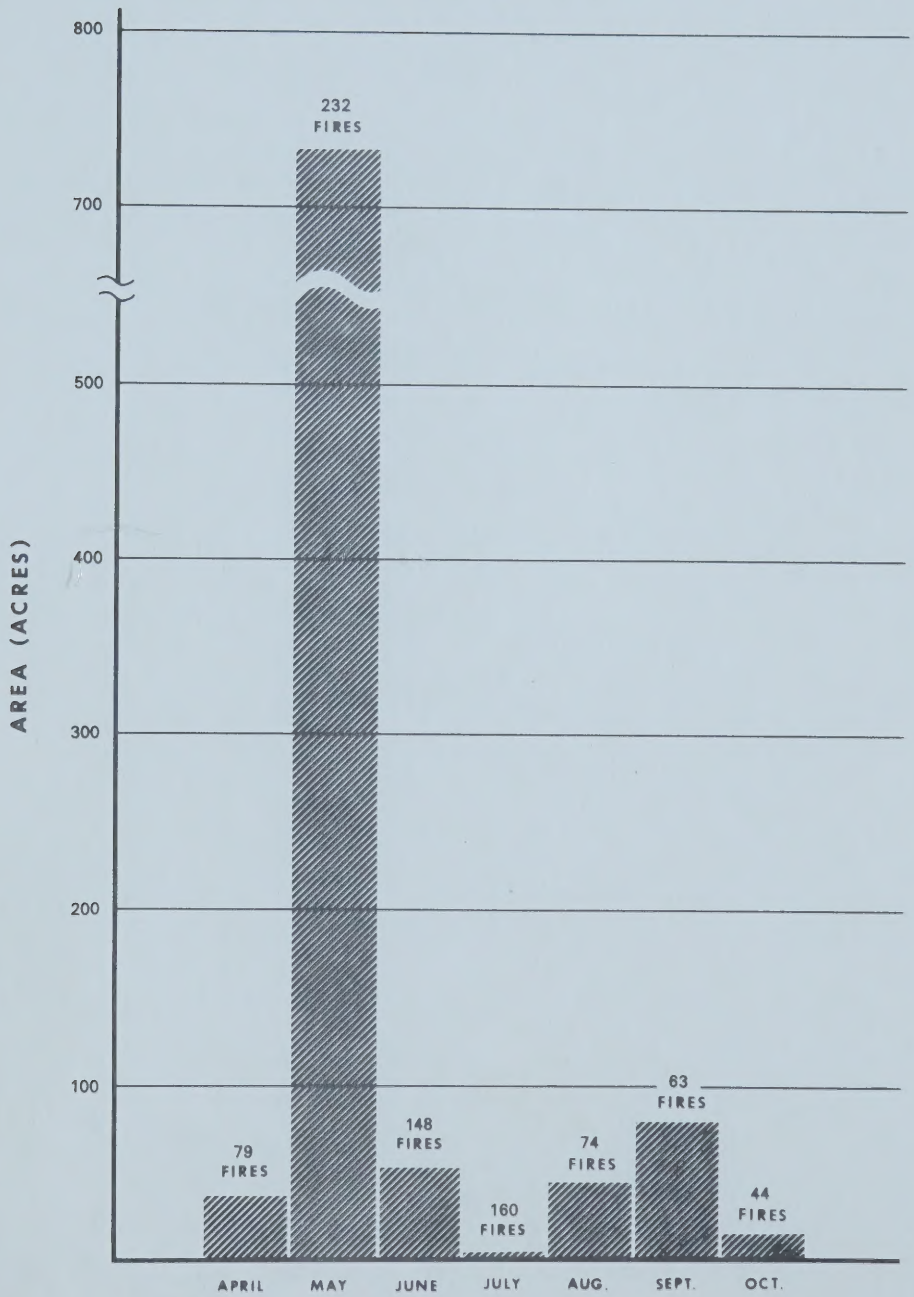
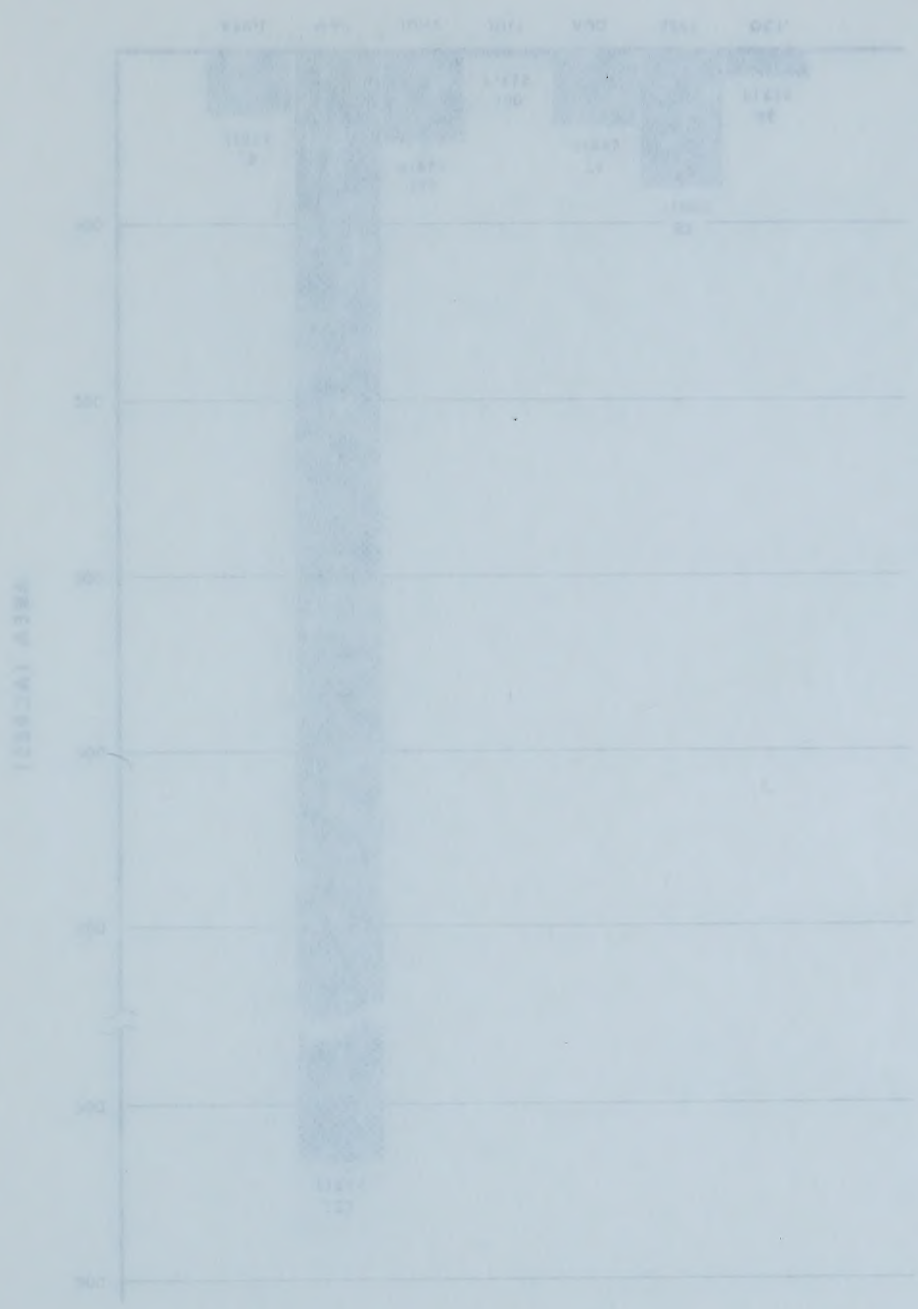


FIGURE 18

WHITECOURT FOREST

AVERAGE ACRES PER FIRE PER MONTH





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